Project Activity : Development of Water Quality Models

Mathematical water quality models can be very useful in determining the causes of poor water quality and predicting the effects of pollution management on a waterbody. Water quality models are often of central importance in the development Total Maximum Daily Loads (TMDLs) under the Clean Water Act. Hood Canal is listed on the state of Washington 303(d) list of impaired waters, and this will necessitate issuance of a TMDL in the future. Ecology administers the TMDL program for the state and maintains a strong modeling capability, and Ecology staff are engaged in nutrient studies in several areas of Puget Sound. The development of a Hood Canal water quality model will enable the agencies to estimate the natural dissolved oxygen conditions in Hood Canal and determine the relative impacts on dissolved oxygen of nutrient pollution sources, including NPDES discharges, onsite sewage systems, tributary inflows, and large scale changes in nutrient levels in Puget Sound.

Hood Canal is an area of particular concern to many people in the region, and stakeholders are collecting valuable information about the canal. Twenty-eight entities, including local, state and federal agencies, tribal governments, non-profits, and universities, have come together to form the Hood Canal Low Dissolved Oxygen Program (HCDOP). One goal of the HCDOP is to determine the sources of the low dissolved oxygen in Hood Canal and effects on marine life. Toward that end, HCDOP is currently coordinating an extensive monitoring effort throughout Hood Canal and adjacent watersheds. This monitoring data will be critically important to the development and testing of the water quality models.

The HCDOP also includes an analysis component, and the University of Washington and USGS are each planning to develop water quality model frameworks for Hood Canal. To support future source control activities by the state, EPA and the Department of Ecology also plan to develop a water quality model for Hood Canal. This model will be developed on a relatively short timeline using off-the-shelf water quality modeling software.

Actions to Date

Discussions with Department of Ecology staff and management on current modeling capabilities and priorities in advance of funding decisions.

Collaboration with the HCDOP

- Participating in Quarterly all-hands meetings

- Review and comment on the Quality Assurance Project Plan (QAPP) for Year 1 modeling and monitoring

Proposed Actions for 2006 Calendar Year

Develop Quality Assurance Project Plan (QAPP) for development of Ecology/EPA water quality model

- Addresses all aspects of the project, including management objectives, model selection, monitoring plans (particularly filling key gaps in current monitoring), data quality, etc.

Collaboration with the HCDOP

- Participating in Quarterly all-hands meetings
- Review and comment on the Quality Assurance Project Plan (QAPP) for Year 2 modeling and monitoring
- Review of any water quality modeling documentation and results from USGS or UW
- Gather all data pertinent to setup and testing of Ecology water quality model

Develop and test Ecology model

- Calibrate/test using 2004 and 2005 data
- Identify monitoring data gaps and priorities
- Compare to USGS and UW model setup and results (if available)

Proposed Actions for 2007 Calendar Year

Complete model development, including tests using 2006 data

- Document model in a technical report
- Conduct peer review (possibly drawing from HCDOP collaborators)
- Run “what if” scenarios to determine relative impacts of sources
- Communicate findings with HCDOP, regulatory programs, local/tribal governments, and stakeholder groups